ABSTRACT

Purpose: The purpose of this study was to evaluate bioactivity of Polyetheretherketone (PEEK) implant material after surface modification by Electron beam deposition of Titanium.

Materials and Methods: Twenty two samples of PEEK were obtained from a single manufacturer, water jet sectioned and divided randomly into two groups of eleven each (Group I & Group II). Eleven PEEK samples from Group II were coated with Grade II commercially pure Titanium by Electron beam deposition technique. One representative sample from each group was evaluated for surface roughness, topography and composition by 3-D surface profilometer, SEM-EDX analysis respectively. Simulated Body Fluid (SBF) was prepared and Calcium (Ca) content in it was quantitatively analysed by ICP-MS technique. Ten samples from each group were then immersed in SBF for a period of 21 days and amount of calcium depletion was analysed to determine the bioactivity of two groups. Surface characteristics and elemental composition of immersed samples were analysed by SEM-EDX and correlated with results of ICP-MS tests. The data obtained were then subjected to statistical analysis.

Results: Group II samples showed significant increase in surface roughness compared to Group I (p value<0.02). There were significant differences in Ca depletion of Group I and Group II samples when compared to pre-immersion Ca content (p value <0.001). When compared between two Groups, Group II samples showed higher Ca depletion (p value <0.001).

Conclusion: Within the limitations of this study it was concluded that PEEK dental implants which were surface modified by electron beam deposition of Titanium has enhanced bioactivity when compared to unmodified PEEK. Hence they can serve as a valuable alternative to conventional dental implant materials.

Key words: PEEK, E-beam, PEEK implants, Titanium, SBF, ICP-MS, Bioactivity.